DOCUMENT RESUME

ED 403 218 SO 027 579

AUTHOR Vanneman, Alan
TITLE Geography: What Do Students Know, and What Can They Do?
INSTITUTION National Center for Education Statistics (ED), Washington, DC.
REPORT NO NCES-97-579
PUB DATE Dec 96
NOTE 6p.
PUB TYPE Reports - Descriptive (141) -- Collected Works - Serials (022)
JOURNAL CIT NAEP Facts; v2 n2 Dec 1996

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; *Educational Assessment; Elementary Secondary Education; Formative Evaluation; Geographic Concepts; *Geography; Geography Instruction; Grade 4; Grade 8; Grade 12; *Knowledge Level; National Competency Tests; *National Surveys; Social Studies; Student Evaluation
IDENTIFIERS *National Assessment of Educational Progress

ABSTRACT

This document summarizes the results of a national survey that tested 4th, 8th, and 12th graders' ability to analyze geographic data in a variety of formats; explain complex geographic phenomena and processes; and show knowledge of relationships between human and geographic events. The survey tested three content dimensions: space and place, environment and society, spatial dynamics and connections, and three cognitive dimensions: knowing, understanding, and applying. Space and place include knowledge of particular places on earth, of spacial patterns on earth's surface, and of the physical and human processes that shape such patterns. Environment and society includes knowledge of human adaptation to and modification of the environment. Spatial Dynamics and Connections includes knowledge of the cultural, economic, and political regions of the world and the connections among them. Data for the students were tabulated against national averages. 90th percentile represented the top performance while 25 percent represented the bottom. Hence, 25th percentile eighth graders could understand a basic map coordinate system and identify major land masses such as South America. Eighth graders from the 90th percentile could use more sophisticated geographic tools, such as climographs, cross-sectional diagrams, and an isotherm map and understand the effects of elevation on climate and vegetation. Each section includes a specific example illustrating the knowledge content and application. Summary profile tables reveal generalized knowledge by age grade and performance percentile. (MJP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Geography: What Do Students Know, and What Can They Do?

Alan Vanneman
National Center for Education Statistics
U.S. Department of Education
Washington, D.C. 20208-5653

1996

ED 403 218

SO 027 579

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

BEST COPY AVAILABLE

NATIONAL CENTER FOR EDUCATION STATISTICS

THE NATION'S REPORT CARD

NAEPFACTS

Vol. 2, No. 2 December 1996

Geography: What Do Students Know, and What Can They Do?

The 1994 NAEP geography assessment reflected new ideas about the importance and content of geography instruction. It examined 4th-, 8th-, and 12th-grade students on their knowledge of geography and their ability to apply that knowledge to the solution of human problems. This issue of ***NAEPfacts*** *discusses student performance near the 25th, 50th, and 90th percentiles for each grade, giving an overall picture of student abilities and limits.*

Over the past decade, educators have given increasing emphasis to systemic and challenging geography instruction in the K–12 system.[1] This emphasis reflects a growing awareness that the peoples of the globe form a single community, with shared economic and environmental concerns. In 1994, the National Assessment of Educational Progress (NAEP) performed the first complete assessment of American students' knowledge of world geography, using separate examinations for 4th-, 8th-, and 12th-grade students.

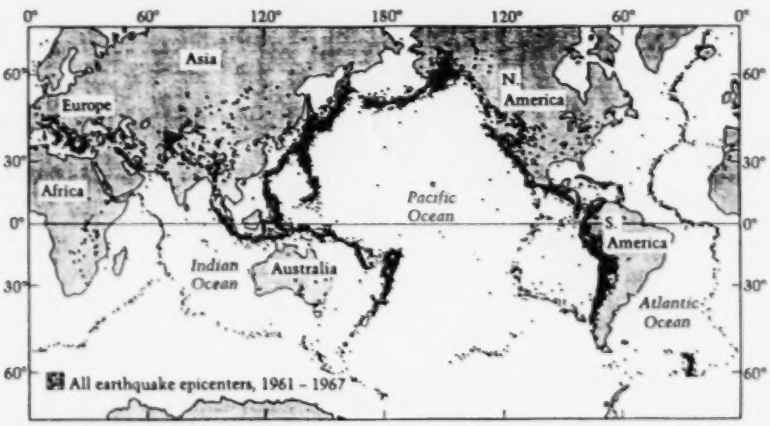

Figure 1. Sample Question from NAEP 1994 Geography Assessment
Eighth graders were asked to identify the cause of the global pattern shown here, obtained by plotting the epicenters of earthquakes occurring between 1961 and 1967. Most knew that the pattern was due to the movement of tectonic plates.

This *NAEPfacts* describes the knowledge and abilities manifested by students near the 25th, 50th, and 90th percentiles for each grade.

The framework for the assessment was developed by the National Assessment Governing Board (NAGB) through a consensus process involving educators, parents, policymakers, geographers, representatives of the business community, assessment experts, and curriculum specialists. The framework has three content dimensions, *Space and Place*, *Environment and Society*, and *Spatial Dynamics and Connections*, and three cognitive dimensions, *Knowing*, *Understanding*, and *Applying*.[2] See figure 1 for a sample question.

Space and Place includes knowledge of particular places on Earth, of spatial patterns on Earth's surface, and of physical and human processes that shape such patterns. *Environment and Society* includes knowledge of human adaptation to and modification of the environment. *Spatial Dynamics and Connections* includes knowledge of the cultural, economic, and political regions of the world and the connections among them. In all three content dimensions, students must *know* factual information, *understand* the significance and meaning of geographic facts, and *apply* knowledge and understanding to solve geographic problems.

The 1994 NAEP assessment required students to analyze data in a variety of formats, explain complex geographic phenomena and processes, and show knowledge of relationships among human problems and events and geographic phenomena. The assessment employed a variety of stimuli, in-

U.S. Department of Education
Office of Educational Research and Improvement

NCES 97–579

BEST COPY AVAILABLE

cluding maps, photographs, tables, and charts. In addition, students taking the assessment spent a large percentage of their time answering constructed-response questions, which required them to write their own answers and create maps and tables.

- The 1994 assessment was NAEP's first full-scale geography assessment. A previous assessment, in 1988, only covered twelfth graders. In addition, the framework for the assessment has been changed. Thus, results of the two assessments are not comparable, even for twelfth graders.

Students' Performance

The 1994 NAEP geography assessment used a scale ranging from 0 to 500 for each of the three grades. Table 1 gives the national average scores for each grade, along with the scale ranges for the 25th, 50th, and 90th percentiles for each grade. Students described as being near a particular level were within a 5-percentile-point range on either side of the specified scale point.[3] For example, the 50th percentile was defined as the region between the 45th- and 55th-percentile points on the scale.

Fourth-Grade Performance

Fourth-grade students near the 25th percentile could read a simple map key and showed some understanding of the location of the equator, the poles and the continents. They could identify a major ecosystem from visual clues and showed an initial understanding of how human actions can affect the environment. *For example, they could read an elevation profile of South Asia and select India as the country with the lowest average elevation.*

Fourth-grade students near the 50th percentile could obtain basic geographic information from atlases, maps, photographs, and bar graphs. They could provide locations on a map of their home state and some of the individual countries of North America. They had a rudimentary ability to construct a weather map. They could answer some uncomplicated geographical questions without the assistance of visual clues, such as questions relating to climate, pollution, and the diffusion of information. *For example, they could locate Hawaii on a map.*

Fourth-grade students near the 90th percentile demonstrated an ability to use scale, measurement, and direction. They could interpret and apply information from simple thematic maps and graphics. They demonstrated an understanding of concepts pertaining to physical geography, ranging from soil erosion to the relationship of the Earth and the Sun. They also displayed some understanding of the interactions between geography and society, such as relationships between climate and economic activities and effects of technology on the environment. *For example, they could recognize that enlarging an airport would increase noise pollution.*

TABLE 1—Geography National Average Scores and Scale Ranges

Grade	National Average	25th Percentile	50th Percentile	90th Percentile
4th	206	170–187	206–216	249–269
8th	260	230–243	258–267	295–312
12th	285	259–270	283–291	316–329

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1994 Geography Assessment.

TABLE 2—Profile of Fourth-Grade Geography Performance by Percentile

Fourth graders near the 25th percentile could:
- read simple maps and diagrams
- identify a major ecosystem from visual clues
- show initial understanding of the relationship between human and natural systems

Fourth graders near the 50th percentile could:
- extract basic information from an atlas, photographs, and other visuals
- give approximate location of home state on a map
- grasp simple concepts, such as relationships between geography and the diffusion of information

Fourth graders near the 90th percentile could:
- use scale, measurement, and direction
- grasp some physical geographic concepts, such as Earth/Sun relationships
- displayed some understanding of the interactions between geography and society

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1994 Geography Assessment.

Eighth-Grade Performance

Eighth-grade students near the 25th percentile could understand a basic map coordinate system, and could identify major land masses such as South America. They could read and extract data from visuals such as diagrams, photographs, and simple graphs. They could locate information on simple reference maps, and, using an atlas, make simple inferences from information contained in thematic maps. *For example, most of them could identify the scale used to measure earthquake intensity.*

Eighth-grade students near the 50th percentile could locate some of the major lakes and rivers in North America. They could construct maps from written instructions with partial accuracy, which improved when a grid system was given. They understood the function of a transit map and had partial success mapping out a specified route. They could grasp some interactions between natural and human systems, such

as relationships between topography and human settlement. *For example, they understood that many early human settlements located in river valleys to take advantage of the fertility of the soil.*

Eighth-grade students near the 90th percentile could use more sophisticated geographic tools, such as climographs, cross-sectional diagrams, and an isotherm map. They could identify the Pacific as the world's largest ocean and knew that Switzerland was located in the Alps. They were able to construct maps with considerable accuracy without the assistance of a grid. They understood the effects of elevation on climate and of climate on vegetation. They had some understanding of the dynamic interconnections between human and physical systems. They could apply uncomplicated concepts of economic development, and could relate geographic concepts to historical knowledge. *For example, they understood the effects of ocean currents on the Peruvian ecosystem.*

Twelfth-Grade Performance

Twelfth-grade students near the 25th percentile could interpret maps that lacked accompanying text, and could use maps to locate a specific region. They demonstrated knowledge of basic physical geographic terms, and had some understanding of such physical phenomena as earthquakes and erosion. They demonstrated some understanding of the impact on populations of such factors as proximity and accessibility. *For example, they could locate Spanish-speaking areas on a world map.*

Twelfth-grade students near the 50th percentile were able to locate some physical features such as United States deserts and identify major world religious centers. They showed such fundamental geographic skills as the ability to read and interpret contour maps, understand map projections, and read a time zone map. They were able to use atlases to answer fundamental physical geography questions relating to climate, natural vegetation, and growing seasons. And they demonstrated knowledge of physical reasons for land use patterns, understanding of such cultural phenomena as diffusion and migration, and some understanding of reasons for trade. *For example, they could compare map projections to determine which showed accurate shapes and areas for major landmasses.*

TABLE 4—Profile of Twelfth-Grade Geography Performance by Percentile

Twelfth graders near the 25th percentile could:
- read and interpret visual material from a map
- recognize basic physical geography terms
- grasp some influences of proximity and distance on relationships between and among peoples

Twelfth graders near the 50th percentile could:
- read and interpret contour maps, different map projections, and a time zone map
- use atlases to answer physical geography questions
- knowledge of major processes of human geography, such as migration and diffusion

Twelfth graders near the 90th percentile could:
- compare different kinds of maps, graphics, and other visuals to draw conclusions and interpret information
- infer some physical geomorphic processes from physical features shown on a map
- understand how political unrest can affect economies

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1994 Geography Assessment.

TABLE 3—Profile of Eighth-Grade Geography Performance by Percentile

Eighth graders near the 25th percentile could:
- read and extract data from visuals, such as diagrams and simple line graphs
- make simple inferences from photographs of a natural region
- read and interpret thematic maps in an atlas

Eighth graders near the 50th percentile could:
- recognize a range of simple physical features and patterns in the environment
- cite probable cause of some natural event
- grasp some simple interactions between natural and human systems

Eighth graders near the 90th percentile could:
- use a range of tools, such as pie charts, population pyramids, and climographs
- understand how elevation affects climate
- apply uncomplicated concepts of economic development and interdependence

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1994 Geography Assessment.

Twelfth-grade students near the 90th percentile could locate and label such features as the Mississippi River and the Rockies on a cross-sectional map of the United States. They could interpret a wide range of visual geographical tools and could draw generally accurate two-dimensional maps. They could compare and assess information drawn from a variety of maps and other tools. They could understand specific examples of the interplay of society and environment and society and geography. They could recognize the economic and political importance of places such as the Suez Canal and demonstrated some understanding of how political unrest can influence economies. They could interpret a map showing language patterns in Africa. *For example, they understood the impact of slavery on Caribbean demographics.*

Conclusion

The NAEP 1994 geography assessment reflects a new awareness of the importance of geography study. The *Geography Framework* expanded the traditional definition of geography to include a wide range of environmental, social, cultural, economic, and political concerns. The 1994 assessment measured student performance across three content dimensions, *Space and*

Place, Environment and Society, and *Spatial Dynamics and Connections*, and three cognitive dimensions, *Knowing, Understanding,* and *Applying*. Educators can compare the framework of the assessment with their own ideas about essential content for courses that involve geography. They can determine for themselves the value of the various analytical tasks set before students by the assessment.

Notes

[1]*Guidelines for Geographic Education: Elementary and Secondary Schools.* Washington, DC: Association of American Geographers and the National Council for Geographic Education, 1984.
Salter, C.L., *Missing the Magic Carpet: The Real Significance of Geographic Ignorance*. Educational Testing Service, 1990, Princeton, NJ.

[2]The content and cognitive area descriptions are taken from the *Geography Framework for the 1994 National Assessment of Educational Progress.* Washington, DC: National Assessment Governing Board, 1994, http://www.nagb.org/pub.html.

[3]A procedure known as scale anchoring was used to develop descriptions of student performance at the 25th, 50th, and 90th percentiles. Around each percentile a band was built to define a range of scale scores. Questions given as examples of student knowledge at a particular percentile were answered successfully by at least 65 percent of the students within that percentile band. The criterion was set at 74 percent for multiple-choice questions to correct for the possibility of answering correctly by guessing. By examining the questions in each band, curriculum specialists identified the knowledge and skills displayed by students at that performance level.

For Further Information

Geography Framework for the 1994 National Assessment of Educational Progress. Single copies available free from the National Assessment Governing Board, 800 North Capitol Street, N.W., Suite 825, Washington, D.C. 20002–4233, (202) 357–6938. Copies may also be obtained at http://www.nagb.org/pub.html.

NAEP 1994 Geography: A First Look; Findings from the National Assessment of Educational Progress, NCES 95–807. Single copies available free from the National Center for Education Statistics, U.S. Department of Education, Washington, DC 20208–5653. Copies may also be obtained at http://www.ed.gov/NCES/naep/.

NAEP 1994 Geography Report Card, NCES 96–087. Single copies available free from the National Center for Education Statistics, U.S. Department of Education, Washington, DC 20208–5653. Copies may also be obtained at http://www.ed.gov/NCES/naep/.

NAEPfacts briefly summarize findings from the National Assessment of Educational Progress (NAEP). The series is a product of the National Center for Education Statistics, Gary W. Phillips, Associate Commissioner for Education Assessment. This issue of *NAEPfacts* was written by **Alan Vanneman**, of the Education Statistics Services Institute, in support of the National Center for Education Statistics. To order other NAEP publications, call Bob Clemons at (202) 219–1690, or email bob_clemons@ed.gov.

The NCES World Wide Web Home Page address is http://www.ed.gov/nces/.

United States
Department of Education
Washington, DC 20208–5653

Official Business
Penalty for Private Use, $300

Postage and Fees Paid
U.S. Department of Education
Permit No. G–17

FIRST CLASS

MS-5725 NCES 97-579 (E4822)

Acquisitions Librarian
Eric Facility
1100 West Street 2nd Fl
Laurel MD 20707-3587